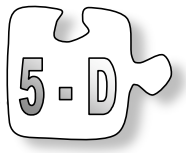
3.2.3 How do I use the 5-D Process?



Strategies for Using the 5-D Process

Math is used to solve challenging problems that apply to daily life. For example, how much fresh water is on the planet? How many area codes (for telephone numbers) are needed in a city? Where should a city build transportation lines such as city bus systems and subways to reduce traffic on the freeways? Mathematics can provide helpful insights for the solutions.

When trying to solve a new and challenging problem, it is useful to have a **strategy**. The 5-D Process that you learned about in Lesson 3.2.2 will often work when you are trying to solve a problem you have not seen before.

In this lesson you will practice using this process to solve more word problems and you will compare the different ways that your classmates use the 5-D Process to help them. Be sure to write your work neatly and be prepared to **justify** your **reasoning**.

As you work using the 5-D Process, consider the following questions:

How can we describe the problem?

How can we decide how to label the columns?

How can we organize the columns?
How can we decide which quantity to start with?
Does it matter which one we choose?

How can we decide which number to try first?

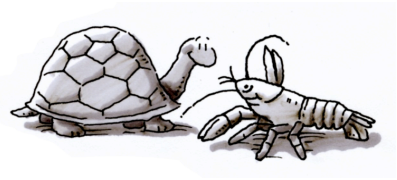
Your team may be asked to present your responses to one or more of the target questions above at the end of this lesson.

3-76. A **scalene triangle** has three unequal side lengths. The medium-length side is 7 cm longer than the shortest side. The longest side is twice as long as the shortest side. The total perimeter is 39 cm. What are the lengths of the sides of the triangle?

3-77. Travis and Angela were playing a Guess My Numbers game. Angela told Travis, "I'm thinking of two positive numbers. The difference of my numbers is 4 and the product of my numbers is 96. What are my numbers?" Help Travis find Angela's numbers.

3-78. The Potter Valley basketball team did not record how many baskets each player made during the last game. Jenny remembers that she made three times as many baskets as Grace. Alexis knows that she made six more baskets than Grace. Joan thinks that she made 4 fewer baskets than Grace. Tammy is sure that she made the same number of baskets as Joan. Altogether the five players made 40 baskets. How many baskets did each player make?

3-79. Ramon was studying pond life in Doyle Park. In two hours, he counted four more frogs than turtles. The number of crayfish he counted was three more than twice the number of turtles. In total, he counted 54 turtles and crayfish. How many frogs were there?



3-80. Dawn is trying to find the dimensions of a parallelogram. She knows that the base is one unit less than twice the height of the shape. The area is 91 square units. How long are the base and height?

3-81. Ms. Pacheco, Mr. Edwards, and Mr. Richards are three math teachers at Turner Middle School. Ms. Pacheco is three years older than Mr. Richards. Mr. Edwards is twice as old as Mr. Richards. The sum of Mr. Richard's age and Mr. Edwards' age is 81. How old is each person?

3-82. **Additional Challenge:** If one side of a square is increased by 12 feet and the side connected to it is decreased by three feet, a rectangle is formed. The perimeter of the rectangle is 62 feet. How long was the side of the original square?

3-83. With your team, re-read the focus questions for this lesson, reprinted below:

How can we describe the problem?

How can we decide how to label the columns?

How can we organize the columns?
How can we decide which quantity to start with?
Does it matter which one we choose?

How can we decide which number to test first?

Discuss the **strategies** you use with the 5-D Process as a team. Be prepared to share your ideas with the class.

METHODS AND MEANINGS

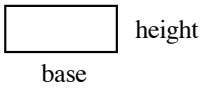
MATH NOTES

Solving Problems with the 5-D Process

The **5-D Process** is an organized method to solve problems. The D's stand for Describe, Define, Do, Decide, and Declare. An example of this work is shown below.

Problem: The base of a rectangle is 13 centimeters longer than the height. If the perimeter is 58 centimeters, find the base and the height of the rectangle.

Describe/Draw: The shape is a rectangle and we are looking at the perimeter.



	Define		Do	Decide
	Height (trial)	Base (height + 13)	Perimeter 2(base) + 2(height)	58?
Trial 1:	10	10 + 13 = 23		66 is too high
Trial 2:	7	7 + 13 = 20	2(20) + 2(7) = 54	too low
Trial 3:	8	8 + 13 = 21	2(21) + 2(8) = 58	correct

Use a trial value.

Use the relationships stated in the problem to determine the values of the other quantities (such as base and perimeter).

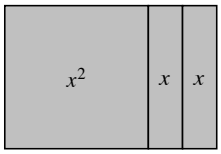
Decide if the answer is correct. Revise and make another trial until you find the correct answer.

Declare: The base is 21 centimeters and the height is 8 centimeters.

Review & Preview

3-84. If the total area of this algebra tile shape is 168 square units, how long is each side? To find out how long the x side must be, copy the diagram and table and answer the questions below.

Describe/Draw



	Define Side #1	Side #2	**Do** (Side one)·(Side	**Decide** Area = 168?
Trial 1:	10	12		
Trial 2:				

Declare:

a. Describe how the lengths of the two sides are related to each other.

b. Which side of the rectangle does Side #2 represent?

c. Use the 5-D Process to complete the table. Find the length of the two sides of the rectangle.

3-85. Evaluate the expression $5+(-3x)$ for the given x-values.

a. $x = 3$ b. $x = \frac{1}{3}$ c. $x = -3$

3-86. Troy has a number cube with the numbers 1 through 6 on it. If each side is equally likely to appear when he rolls the cube, find the following probabilities. (Note: When two or more numbers are multiplied, each of the numbers is a factor of the product.)

a. P (rolls a 2) b. P (rolls an odd number)

c. P (rolls a factor of 6)

3-87. Simplify the following expressions using the order of operations.

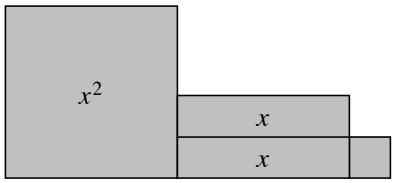
a. $3(8-4)+4^2-(2+3)$

b. $7\cdot 4-3\cdot 8+2^2-6$

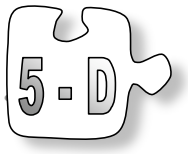
c. $7-(-3)+(-4+3)$

d. $-6-4(3\cdot 2)+5^2$

3-88. Write expressions for the perimeter and the area of this algebra tile shape. Then simplify each expression by combining like terms.



3.2.4 How can I represent it?



Using Variables to Represent Quantities in Word Problems

In Section 2.1, you used variables to help you describe the perimeter of tiles. In that situation x could be stretched to represent any positive number. Today you will continue to use the 5-D Process as you solve word problems and you will use a variable to represent the unknown value in the problem.

Think of these questions as you work on the problems today:

What is the problem asking?

What is the relationship between the quantities involved?

How can I choose which part of the problem to represent with a variable?

3-89. Thu has one mini-box of Choco-Blasters, and Warren gave her three more pieces. Samara has two mini-boxes of Choco-Blasters and she gave six pieces to Will. Now Thu and Samara have the same number of Choco-Blasters left.

How many Choco-Blasters are in a mini-box? Assuming all mini-boxes of Choco-Blasters have the same number of pieces in them, use the 5-D Process to solve this problem.